LAUDA

Operating instructions

Controlled **high-temperature cooling**

With LiBus Control

Valid from series: LCZ 9663-06-0001
04/ 06
YACE0082 / 04.10.06

from software version of Control system : 1.44
from software version of protection system : 1.33
from software version of Operating system : 1.53
from software version of solenoid valve : 1.38

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Explanation of signs

	Danger:	This sign is used where there may be injury to personnel if a recommendation is not followed accurately or is disregarded.
	Note:	Here special attention is drawn to some aspect. May include reference to danger.
	Reference	Refers to other information in different Sections.

1 Safety notes

Before operating the equipment please read carefully all the instructions and safety notes in Section 1.1.
If you have any questions please phone us!

Follow the instructions on setting up, operation etc. This is the only way to avoid incorrect operation of the equipment and to ensure full warranty protection.

- Transport the equipment with care!
- Equipment and its internal parts can be damaged:
  - by dropping,
  - by shock.
- Equipment must only be operated by technically qualified personnel!
- Never operate the equipment without heat carrier liquid!
- Do not start up the equipment if
  - it is damaged or leaking,
  - Cable (not only supply cable) is damaged.
- Switch off the equipment and pull out the mains plug:
  - for servicing or repair,
  - moving the equipment!
- Do not carry out any technical changes on the device!
- Have the equipment serviced or repaired by properly qualified personnel only!

The Operating Instructions include additional safety notes which are identified by a triangle with an exclamation mark. Carefully read the instructions and follow them accurately! Disregarding the instructions may have serious consequences, such as damage to the equipment, damage to property or injury to personnel!

We reserve the right to make technical alterations!

1.1 Safety information

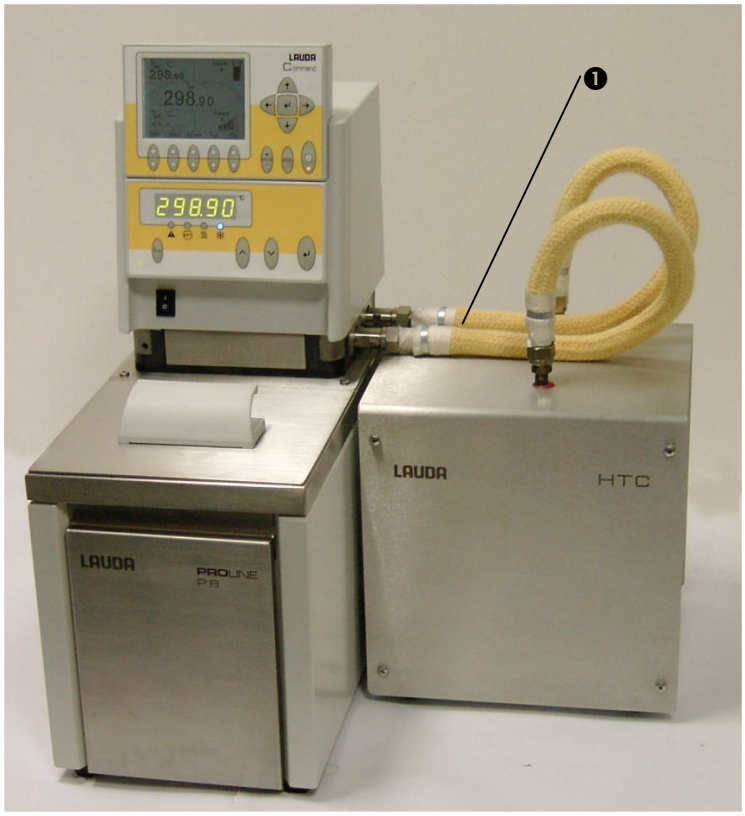
- A high temperature cooler is used to cool temperature stabilizing liquids as prescribed. This leads to hazards due to the hot temperature stabilizing liquids, the emission of water and to general hazards due to the use of electrical energy.
- The user is largely protected by the application of the relevant standards.
  It is not possible to include all possibilities. They remain essentially subject to the judgment and responsibility of the operator.
- The devices may only be used as intended, that is as described in this operating manual. This includes operation by instructed specialist personnel.
- The devices are not designed for use under medical conditions according to DIN EN 60601-1 or IEC 601-1!

1.2 Other safety information

- Only use the supplied pipe connections or metal corrugated hoses.
- Protect tubing for water cooling with hose clips against slipping off. Prevent kinking of tubing!
- Check the hoses from time to time for any material fatigue.
- Take into account the thermal expansion of the heat carrier liquid with increasing bath temperature.
- Cool the thermostatic medium to below 60 °C before cleaning, maintenance, emptying or moving the high temperature cooler.
- Have repairs carried out only by specialists!
- Values for temperature control and indicating accuracy apply under normal conditions according to DIN 12876. High-frequency electromagnetic fields may under special conditions lead to unfavourable values. This does not affect the safety.

2 Functional elements

Example: Operating side of P 8 with HTC connected on the right

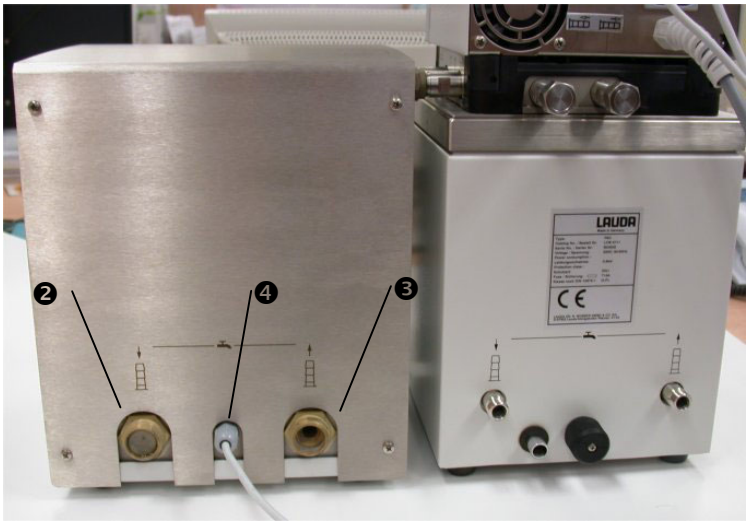


Space-saving connection with the Proline Thermostatic Baths P 5, P 8, P 18 and P 26 with siting of the HTC at the side.

❶ Connection between P 8 and the high temperature cooler HTC.

Ensure that the inputs and outputs are connected correctly. If the inputs and outputs are mistakenly interchanged, the seals on the internal solenoid valves will be damaged.

HTC rear view



❷ Cooling water feed.

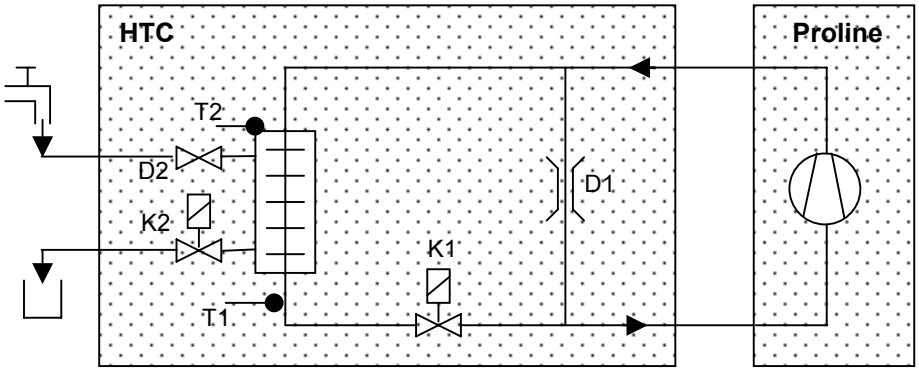
❸ Cooling water outlet.

❹ LiBus connecting lead to the thermostat.

3 Device description

3.1 Principle of operation

In conjunction with the HTC high temperature cooler, LAUDA heating thermostats with LiBus control (e.g. Proline heating thermostats) can very effectively and safely be used with cooling water for active cooling at temperatures up to 300 °C. This is achieved in the HTC in that only so much hot thermostatic medium is introduced into a coaxial heat exchanger via the valve K1 that the cooling water does not exceed a temperature of approx. 60 °C as measured on the sensor T2. A bypass in the HTC facilitates an adequate bath circulation of the temperature stabilizing liquid in the heating thermostat even when cooling is not taking place (K1 closed). The HTC high temperature cooler is supplied electrically directly through the LiBus connection from a thermostat.



K1 Valve for temperature stabilizing liquid
D1 Bypass
T1 Temperature sensor for temperature stabilizing liquid
K2 Cooling water valve
D2 Throttle diaphragm in the cooling water feed
T2 Temperature sensor for cooling water

3.2 Cooling water

For proper cooling the HTC high temperature cooler needs a cooling water flow of approx. 5 litres/min. To prevent the flow of cooling water becoming unduly large, a throttle diaphragm is built into the cooling water feed. In normal domestic water supply networks (with 3.5 to 5 bar) it reduces the flow of cooling water to the required amount. The diaphragm must be removed for water pressures below 3.5 bar. Higher pressures up to 10 bar are not critical.

3.3 Controller and safety devices

The closed-loop control technology of the HTC high temperature cooler is able to adapt the cooling power to the requirements of the temperature stabilizing task. In this respect a control accuracy of ±0.3 K in the "cooling" operating mode and approx. ±0.02 K in the "non-cooling" operating mode can be achieved. The cooling water is used particularly sparingly.

The electronic monitoring ensures that no boiling processes can arise in the HTC high temperature cooler. Also when the supply of cooling water fails.

3.4 Substances / materials in the water circuits

All of the parts which come into contact with the thermostatic medium are of:

stainless steel, Viton, silver solder, brass*.

*Brass is subjected to 150 °C maximum so that the LAUDA temperature stabilizing liquids Ultra 300 and Ultra 350 can be used.

All of the parts which come into contact with the cooling water are of:

stainless steel, Viton, silver solder, brass, copper.

4 Unpacking

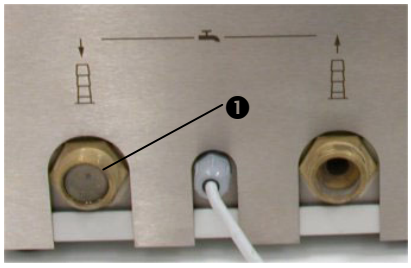
After unpacking, firstly check the device and accessories for any damage in transit. If contrary to expectations the unit is found to be damaged, the shipping company must be immediately informed so that verification can take place. Please also inform the LAUDA Service Center (Contact ⇨ 9.2).

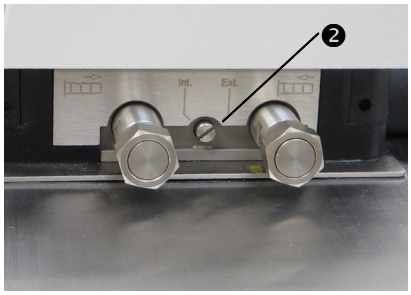
Standard accessories:

Quantity	Article	LAUDA Article number
1	This Operating instructions	YACE0082
2	Hose olive G ¾ for ½" hoses	EOA 001
2	Corrugated hoses for the connection of Proline Thermostatic Baths P 5 (C), P 8 (C), P 12 (C), P 18 (C) and P 26 (C)	LZM 040

5 Preparations

5.1 Siting and connection





- Site the unit on a level surface.
- The unit must not be put into operation if its temperature due to storage or transport has been reduced below the dew point.
  Wait approx. 1 hour.
- Connect the external cooling water feed and return.
- Secure hoses against slippage by using hose clips.
- A sieve ❶ and a throttle diaphragm are located in the cooling water feed. In domestic water supply networks (with 3.5 to 5 bar pipe pressure) the throttle diaphragm reduces the amount of cooling water. The diaphragm must be removed for pressures below 3.5 bar. Higher pressures up to 10 bar are not critical.
- Set the internal/ external selector ❷ on the Proline thermostat to external mode.
- Check whether on the Proline thermostat the control software version 1.44 or higher is installed. Update it if necessary.
- Plug in the LiBus lead of the HTC into a free socket on the thermostat.
- Connect the HTC to the thermostat using the two supplied corrugated hoses. Follow the directions of flow as labeled on the thermostat and the HTC. ⇨ Illustration in Chapter 2 and on the next page.

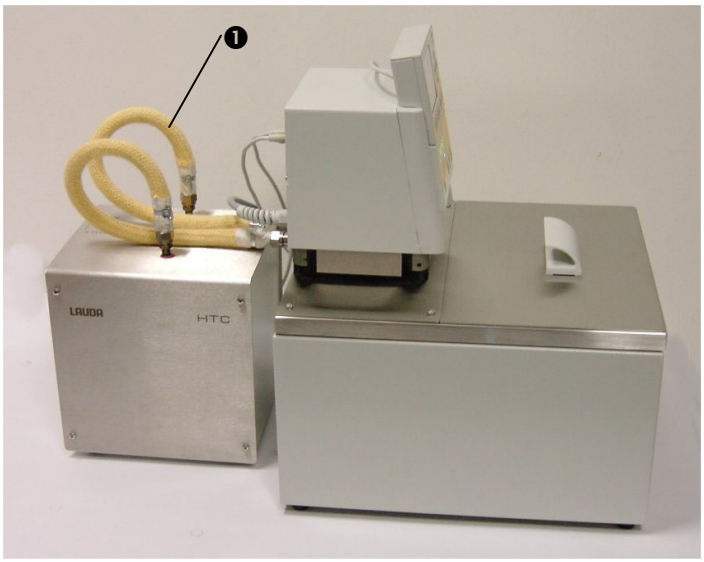
Example: Operating side of P 12 with HTC connected on the right

Space-saving connection of the Proline Heating Thermostat P 12 with siting of the HTC at the side.

❶ Connection between P 12 and HTC.

Ensure that the inputs and outputs are connected correctly. If the inputs and outputs are mistakenly interchanged, the seals on the internal solenoid valves will be damaged.

Example: Operating side of P 18 with HTC connected at the rear



Space-saving connection with the Proline Heating Thermostat P 18 with siting of the HTC behind the thermostat.

❶ Connection between P 18 and HTC.

Ensure that the inputs and outputs are connected correctly. If the inputs and outputs are mistakenly interchanged, the seals on the internal solenoid valves will be damaged.

☞	- With the connection of the HTC high temperature cooler the bath level in the thermostat falls, because the HTC is filled when the pump is switched on. → Top up if required.
⚠	- Contaminated cooling water may lead to blockage of the sieve or of the heat exchanger. - Ensure that the inputs and outputs are connected correctly. If the inputs and outputs are mistakenly interchanged, the seals on the internal solenoid valves will be damaged. - Pay attention to the maximum permissible pressures (⇨ 10).

6 Starting up

- Ensure that the direction of flow of the cooling water corresponds to the printed arrows.
- Ensure that cooling water is always available in operation, even when temporarily no cooling power is being demanded.
- Ensure that the unit is connected to a Proline heating thermostat according to Chapter ⇨ 5.

- Ensure that the HTC is connected via the LiBus to a heating thermostat which is compatible with the LiBus.
- Ensure that in the Proline thermostat the control software version 1.44 or higher is installed.
- The correct connection of the HTC is displayed in the menu module of the heating thermostat.
- Ensure that on the Proline thermostat the internal/ external selector is switched to external mode.
- Provide cooling water.
- The HTC high temperature cooler operates automatically after switching on the Proline heating thermostat and is controlled to the requirements as specified on the Proline thermostat.
- When the Proline heating thermostat demands cooling from the HTC high temperature cooler, the blue LED "Cooling" illuminates on the Proline control panel. Under partial power this flashes.
- The control parameters may need to be adapted. Tried and tested control parameters for the P 8 with bath medium ULTRA 300: Pump level = 8; Xp = 16.0; Tn = 80.

If water or aqueous solutions are used as the bath medium, a pump level of maximum 4 on the Proline thermostat is sufficient. This reduces acoustic noise without impairing the cooling power.
Pump levels for oil and water ⇨ 10.

6.1 Optimizing the thermostat control with the HTC

If the best possible temperature stability is to be achieved, then the control and the setting of the bypass valve on the Proline operating panel (⇨ 5) must be optimized.
Different settings are advantageous depending on whether the internal bath is used (internal mode), or whether an external load is connected (external mode):

6.1.1 Internal mode without external load	6.1.2 External mode with external load
- The bypass valve (⇨ 5) is set step-by-step from "External" to "Internal" until the desired bath temperature stabilization is achieved. - In this operating mode part of the bath liquid flow is not passed through the HTC. The bath circulation is here improved in the "Non-cooling mode" and the maximum cooling power is reduced in the "Cooling mode". An application-specific optimum can be achieved by the step-by-step adjustment. Optimization is particularly advantageous with large baths, from P 12 upwards. Guide value: If with the P8 the external selector is set to 50% (vertical position), then the time required for cooling extends by approx. 50% (e.g. from 200 °C to 100 °C from previously 8 minutes to 12 minutes). In this way better circulation is achieved with a temperature accuracy up to ±0.02 °C. - Then optimize the control parameters according to the Proline operating manual.	- Set the Proline bypass valve (⇨ 5) to "External". - In this operating mode the pump flow must always be shared between the external load and the HTC. To do this, connect the external load to the second pump connection on the Proline thermostat. (A serial arrangement is unfavorable, because the valve K1 of the HTC (see 3) is closed in some operating states so that only a very small part of the flow is left to pass through the HTC bypass D1). - It may be necessary to also adjust the flow through the reducing valves so that both the HTC and the external load receive sufficient flow. - Then optimize the control parameters according to the Proline operating manual.

7 Draining / frost protection

If the HTC high temperature cooler is to be separated from the thermostat or if ambient temperatures below 0 °C are to be expected, the unit must be drained.

7.1 Draining the cooling water circuit

- Turn off the pressure from the cooling water hoses and remove them.
- First, read the thermostat operating instructions regarding the unit operating structure, if you have not already read them.

Master: Modul → HtC. . . → unF ıll	
Command: Menu → Module → HTcool → Start draining → On.	
To prevent scalding, proceed as follows depending on the bath temperature:	
Bath temperature below 60 °C - Thermostat enters the standby mode - The HTC opens the cooling water and bath media valves - OPEn is displayed.	Bath temperatures above 60 °C - Thermostat enters the standby mode - However, the valves remain closed - uu 1606 is displayed.

- Drain the heat exchanger using compressed air on the cooling water feed.
- Alternatively: Empty using a waterproof industrial vacuum cleaner on the "Cooling water output" connection. Only drain the water circuits in this way!!

Master: To close the valves and quit the menu press .
Command: Menu → Module → HTcool → Start draining → Off.

- After draining the circuits completely switch off the Proline unit and withdraw the LiBus connecting lead.

- When blowing out with compressed air, water is emitted on the cooling water output.

- If the draining procedure is to be interrupted, press the key repeatedly to return to the higher level menu.

7.2 Draining the thermostatic medium circuit

Master: Modul → HtC. . . → unF ill	
Command: Menu → Module → HTcool → Start draining → On.	
To prevent scalding, proceed as follows depending on the bath temperature:	
Bath temperature below 60 °C: - Thermostat enters the standby mode - The HTC opens the cooling water and bath media valves. - OPEn is displayed.	Bath temperatures above 60 °C: - Thermostat enters the standby mode - However, the valves remain closed. - uu 1606 is displayed.

- Remove the HTC high temperature cooler from the Proline unit.
- Blow into the thermostatic medium feed with compressed air to drain the heat exchanger.

Master: Press to close the valves and to quit the menu.
Command: Menu → Module → HTcool → Start draining → Off.

- After draining the circuits completely switch off the Proline unit and withdraw the LiBus connecting lead.

- When blowing out with compressed air, thermostatic medium is emitted on the thermostatic medium output.
- Do not empty the temperature medium circuit with an industrial vacuum cleaner or similar device, because then there is a risk of fire and explosion!

- If the draining procedure is to be interrupted, press the key repeatedly to return to the higher level menu.

- Hose couplings are not self-closing.
- Do not forget to fit the plugs on the pump connectors of the Proline thermostat after removing the HTC high temperature cooler.
- Never draw up flammable media into an industrial vacuum cleaner!

- Carry out appropriate decontamination if dangerous material is spilt on or in the unit.
- The cleaning or decontamination method is determined through the user's specialist knowledge. In case of doubt contact the manufacturer.

8 Special functions of the HTC software

8.1 Displays

Master:

Menu → HtC... → Show enter the display mode with the enter key, then page with the cursor keys:

Ver	Module software version.
P1 x	Displays switching state of Solenoid Valve 1 (thermostat circuit). 0 = CLOSED, 1 = OPEN.
P2 x	Displays switching state of Solenoid Valve 2 (cooling water). 0 = CLOSED, 1 = OPEN.
t1 x	Temperature of NTC1 in the thermostat circuit in °C.
t2 x	Temperature of NTC2 in the cooling water circuit in °C.
U24	Displays 24V supply voltage.
Snr_H	Serial number, high word.
Snr_L	Serial number, low word.
End	Quits the display level.

Command:

- Module software version: Menu → Settings → Device status → Software version.
- Module serial number: Menu → Settings → Device status → Serial numbers.

8.2 Resetting the HTC to the factory setting

Master: Menu → HtC... → dEF press the enter key for a few seconds. The cooling liquid valve is reset to the factory setting.

9 Maintenance

9.1 Cleaning the surface of the device

Cleaning can be carried out with water to which a few drops of surfactant (washing-up liquid) have been added and using a damp cloth.

9.2 Cleaning the lines of the thermostatic circuit

When the thermostatic medium is changed, the remainder of the previous liquid must be rinsed out. To do this, open the valve in the thermostatic circuit as outlined in Section 7.2 and rinse with a suitable solvent. Then blow dry.

- The HTC and the thermostat are NOT flame-proof. Provide adequate ventilation.
- No solvent may enter the HTC high temperature cooler!

- Carry out appropriate decontamination if dangerous material is spilt on or in the unit.
- The cleaning or decontamination method is determined through the user's specialist knowledge. In case of doubt contact the manufacturer.

9.3 Maintenance and repair

- **Contaminated water in the cooling circuit can lead to blockage of the sieve and, under some circumstances, of the heat exchanger. Check the sieve (⇨ 5) regularly for contamination.**

LAUDA high-temperature cooling HTC are largely maintenance-free. If the heat carrier liquid becomes dirty it has to be replaced.

- Have the equipment serviced or repaired by properly qualified personnel only!

Your contact for service and support:

LAUDA Service Center
Telephone: +49 (0)9343/ 503-236 (English and German)
E-Mail service@lauda.de

When ordering replacement parts, please state the type of unit and number on the rating label on the rear panel of the unit. This avoids queries and supply of incorrect items.

The serial number is combined like following, for example. LCZ 9663**-06-0001**

LCZ 9663	=	article order number/ Ref. No,
06	=	manufacturing year 2006
0001	=	continuous numbering.

10 Technical Data

The figures have been determined according to DIN 12876.

Ambient temperature range	°C	5...40
Temperature range cooling water	°C	5...30
Temperature range heat carrier liquid	°C	5...300
Temperature accuracy	±K	0,3
Safety features		Warning: No cooling water present. Warning at emptying: Bath liquid temperature >60°C.
Cooling power Ultra 350 / water at pump level 8	kW	4,7 at t_{bath} 300 °C 4,7 at t_{bath} 200 °C 2,8 at t_{bath} 150 °C 0,9 at t_{bath} 100 °C
Cooling power water / water at pump level 4	kW	10,5 at t_{bath} 95 °C 8,7 at t_{bath} 80 °C 5,8 at t_{bath} 60 °C 2,8 at t_{bath} 40 °C 1,5 at t_{bath} 30 °C
For cooling circuit volume flow	L/min	5
For cooling water input temperature	°C	15
Required cooling water pressure	bar	3.5 to 5 with throttle diaphragm 1.0 to 3.5 without throttle diaphragm
Maximum permissible cooling water pressure	bar	10
Height	mm	255 without media connections
Overall dimensions B x L	mm	240 x 215 without cooling water connections
Weight	kg	8,8

We reserve the right to make technical alterations!

Devices according to EU Directive 89/ 336/ EEC (EMC) and 73/ 23/ EEC (Low voltage) with CE label.

BESTÄTIGUNG / CONFIRMATION / CONFIRMATION

An / To / A:
LAUDA Dr. R. Wobser • LAUDA Service Center • Fax: +49 (0) 9343 - 503-222

Von / From / De :

Firma / Company / Entreprise: _____

Straße / Street / Rue: _____

Ort / City / Ville: _____

Tel.: _____

Fax: _____

Betreiber / Responsible person / Personne responsable: _____

Hiermit bestätigen wir, daß nachfolgend aufgeführtes LAUDA-Gerät (Daten vom Typenschild):
We herewith confirm that the following LAUDA-equipment (see label):
Par la présente nous confirmons que l'appareil LAUDA (voir plaque signalétique):

Typ / Type / Type :	**Serien-Nr. / Serial no. / No. de série:**

mit folgendem Medium betrieben wurde
was used with the below mentioned media
a été utilisé avec le liquide suivant

_____

_____

_____

_____

Darüber hinaus bestätigen wir, daß das oben aufgeführte Gerät sorgfältig gereinigt wurde, die Anschlüsse verschlossen sind, und sich weder giftige, aggressive, radioaktive noch andere gefährliche Medien in dem Gerät befinden.

Additionally we confirm that the above mentioned equipment has been cleaned, that all connectors are closed and that there are no poisonous, aggressive, radioactive or other dangerous media inside the equipment.

D'autre part, nous confirmons que l'appareil mentionné ci-dessus a été nettoyé correctement, que les tubulures sont fermées et qu'il n'y a aucun produit toxique, agressif, radioactif ou autre produit nocif ou dangeureux dans la cuve.

Stempel **Seal / Cachet.**	**Datum** **Date / Date**	**Betreiber** **Responsible person / Personne responsable**

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